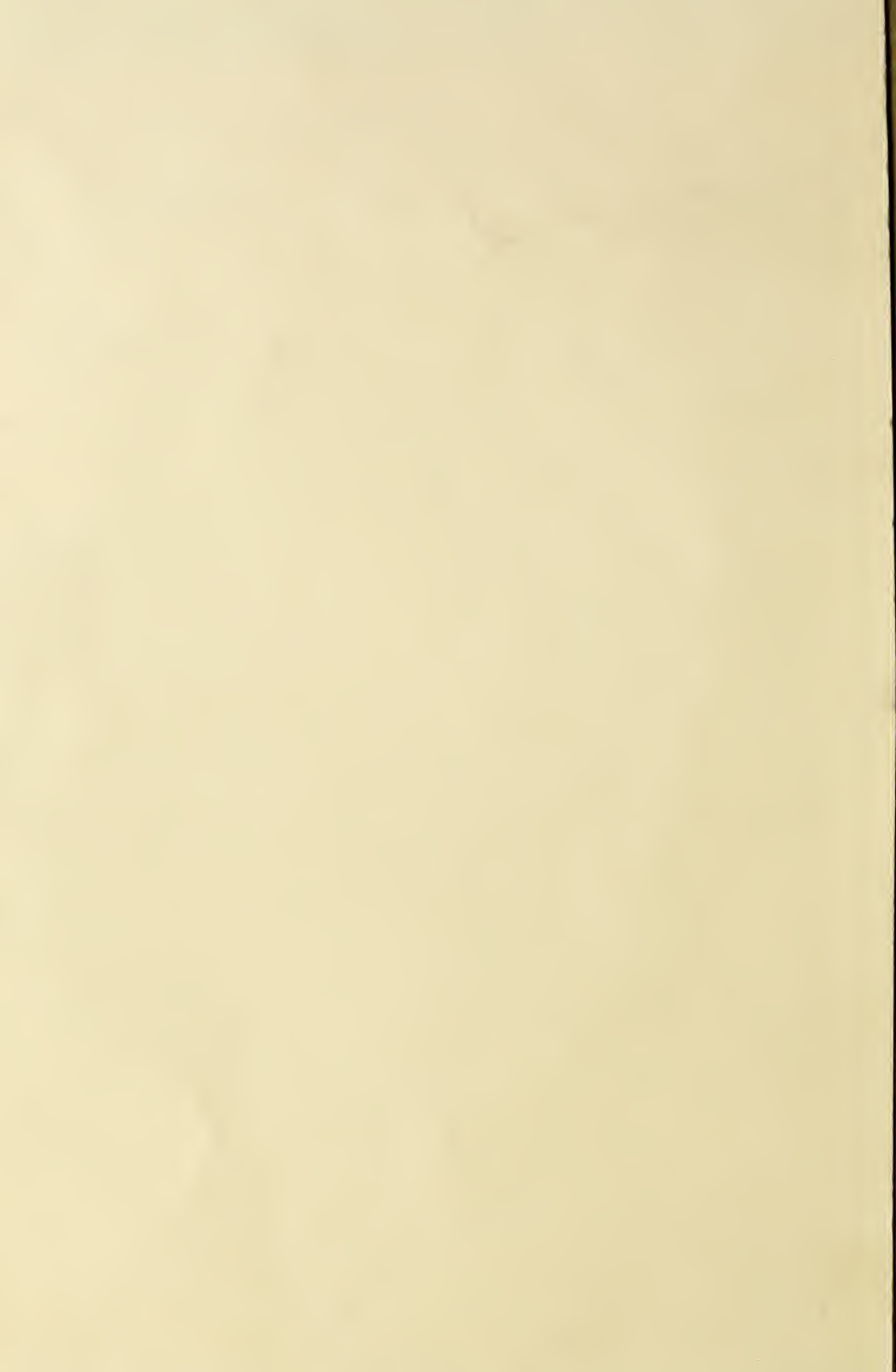


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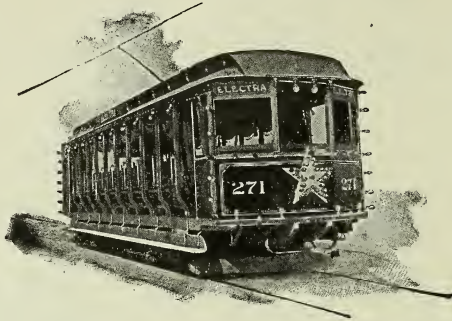
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# THE AGRICULTURAL STUDENT.

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### STAFF.

J. C. White	W. H. Palmer
E. S. Poston	L. E. Call
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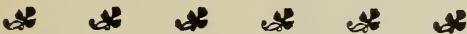
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### EDITORIAL CHAT.

Within the last month important events have been transpiring at Washington which will not fail to exert an influence in all farming communities and especially those given to meat production. Of these events the most important are the decision of the Supreme Court against the Meat Trust, spoken of in another column of THE STUDENT, and the turning down of the Hepburn Bill.

This latter bill, introduced by Senator Hepburn of Iowa, and commonly dubbed the railway rates bill, because of its being believed to embody the idea of the railway authorities, received its deathblow early in the month of February. Mr. Hepburn, the author of the bill, is chairman of the house interstate commission, and did his best to secure favorable action in the committee, but his Republican colleagues refused to stand by him, and John Sharp Williams, leader of the Democratic minority, hearing of the situation, called the Democratic members of the committee and urged them to act against the measure, completing the good work which the Republicans had started, thus burying





the Hepburn bill beyond all danger of resurrection. This was sufficient to at least insure the defeat of that measure and for that we may be thankful. What sort of bill may succeed in getting through the house is not now known, but the committee are diligently at work. One source of wonder arising over this bill lies in the fact that it is championed by a member of Congress from the State of Iowa, which because of its great live stock interests would be to a great extent injured by such a measure. It would appear that there is either a motive of self-interest back of it or that Senator Hepburn was far from being in touch with the constituency which he represents. That Iowa's populace are not in favor of the bill is evident from the loud wail which arose from that state when the measure was proposed and from the hard knocks which it received from the hands of the agricultural press of that state.

---

Recently while stopping in a decidedly rural district of this state, I was surprised and pleased to meet a gentleman who was evidently greatly interested in the State Agricultural College, and who as he expressed it, had "for years been laboring with his neighbors, to get them to farm in a better and more satisfactory manner." Upon discovering that I was in attendance at the Agricultural College, he began to ply me with numerous questions, which I answered satisfactorily to him. Now, this form of interest is the kind that means well for the future of agriculture, further showing that our farmers are beginning to awaken to the fact that the Agricultural College and Experiment Stations are sources from which they are receiving great benefits.

But this is not the only place where the Agricultural College is gaining

ground. In the city as well as the country one finds people who are deeply interested in the work done in such institutions. The daily newspaper is likewise coming to comprehend that great things are thus being brought about. An editorial in the Chicago Tribune, issue of January 30, says: "Thirty years ago there was universal apathy among the farmers regarding the development of agriculture. The fields were plowed in the same old way. The harvester and reaper had taken the place of the primitive 'cradle,' and machinery was gradually supplanting hand labor, and there was a growing understanding of the necessity of crop rotation, yet of real scientific agriculture there was little knowledge, and little interest was taken in it. The farmers' institutes were poorly attended. The farmers regarded education as a stepping stone to success in law, medicine and theology, but of no practical value on the farm. The farmer's son who received a college education looked upon the return to the farm as an abandonment of all attempt to put his special advantages to practical use.

But there has been a change. Science has touched the soil with her magic fingers. The farmers are eager to learn what the classroom has to say about the fields. The farmers' institutes have a larger attendance than the political meetings. The agricultural colleges are multiplying, and they are filled with earnest students. The special gospel trains, which bring the apostles of scientific agriculture are thronged with listeners. The 'new agriculture' is not of sentimental growth. It is extremely practical. It means more dollars for every acre of ground under cultivation. It means the use of land which was formerly considered worthless. For this reason business men and railroads

have been quick to see the practical value of the new scientific agriculture, and are making efforts to extend it as far as possible."

With men of all occupations and professions looking thus upon the agriculture of the future, the outlook of our chosen profession is exceedingly encouraging.

Throughout the last month the eyes of all nations have been upon the revolutionary outbreak in the Russian Empire. The exact feelings of many of the Russian peoples against the Czar and other men in power was a revelation to many people in other countries of the civilized world. That discontent was present was, of course, known to all, but its widespread influence was never conceived by many.

Arising, from the apparently ruthless massacre of workmen in the streets of St. Petersburg on January 22, a wave of revolution swept over the empire in an incredibly short time which seemingly would tear it asunder.

Let none think this revolution is the work of a day, a year, or a decade. It is the inevitable sequence to centuries of oppression of the poor and ignorant of Russia, while the world, taking for its cue and as its hope and promise, the American Revolution, has gone steadily forward toward the goal for which every soul aspires—liberty as expressed by democracy. An ignorant race of serfs led the autocratic czars of a cen-

tury ago to treat the people like so many cattle; these poor people were kept in darkest ignorance and most wretched poverty by a government claiming authority direct from God, as always through history, tyrants have justified their greatest tyrannies on the grounds that they were following the dictations of the will of the Supreme Ruler. Just as the streets of St. Petersburg ran red with the blood of innocent people on Sunday, January 22, so almost eighty years ago—December 19, 1825,—were the thoroughfares of that city stained with human blood shed in the cause of liberty. But the revolutionists of that day were few in numbers, and lacked organization, and Nicholas I., hanged many of the leaders, exiled many of their followers to Siberia, while the remainder were for the moment compelled to adopt secret methods for carrying out the plans of securing the freedom they so loved. For many years it has lain dormant and has now but broken forth in these present revolutionary demonstrations. Whether it now bears fruit, lies in whether it is disseminated among enough of the Russian peoples to enable them to declare their rights and by strength to maintain them. If not, the results must be the same as those of the uprising of eighty years ago. Naturally the sympathies of the American people, because of their love for freedom, is on the side of those striking for liberty.



## THE AGRICULTURAL CLUB AND THE FARMERS INSTITUTE.

SUPERINTENDENT A. B. GRAHAM.

The farmers' institute presents one of several opportunities to impress upon children the importance of their experimental as well as their theoretical work in elementary agriculture. There is an additional opportunity to emphasize the real pleasures and advantages of a rural life. At a well conducted institute the child hears valuable discussion by practical, up-to-date farmers and scientists. There is an early impression formed that his father's work on the old farm involves as much of pure science requiring careful observation and thought and quite as much to require a carefully guided practice in art, if not more, than there is in any other business apparently more inviting.

Here is one place to point out and emphasize the real advantages of rural life, in that which makes for the highest quality of manhood and womanhood. Here as well as in the home and school, attention of boys and girls should be called to the richness of beauty in nature.

The executive committee of the Clark County Farmers' institutes last year voted to hold an institute at Springfield in January. For some reason the institutes held at Springfield had not been well attended and it was decided to have a one-day session at which about half of that time should be given to the children. Arrangements were made for an exhibit of work done by the boys and girls with corn. An additional exhibit of common weeds, etc., was made. Papers on "Corn," "The Value of Birds," and "The Rural Home" were read by the young people. At the afternoon session, Dean Price and Prof. Miller made excellent talks. There was not

room enough to accommodate those who desired to hear.

This year the committee again decided to hold another institute at Springfield. They desired that a larger exhibit of the work in elementary agriculture be made and that the children be given a much larger part on the program. That the children might take up much of the time, the following program was arranged:

"Tillage" . . . . . Master Harry Reese  
 "What a Boy Can Learn About Bees"

Master Armine Arthur  
 Report of Agricultural Club's Work

Elliott Goodfellow  
 "Potato Culture" . . . . . Elza Trout  
 "Culture Elements in Rural Life"

Etta Bitner

Six sub-district schools were represented in the music. A few selections pertained to rural life.

Prof. McCall explained the Ohio score card for corn, and in the afternoon gave a short talk on "Selecting Seed Corn." Prof. Plumb gave a talk on "Practical Work in Animal Husbandry."

The elementary school children were represented in the exhibit and by the first four subjects and the music; the high school boys, (Springfield township) who made exhibits of corn, and the college by Miss Bitner, the daughter of a progressive farmer.

The exhibit was made up of the best corn and potatoes raised by the boys, a few carrots, and flowers raised by the girls, pressed weeds and bottled weed seeds, sections of the common forest trees and their leaves, common rocks, insects mounted in cigar boxes, a sail testing outfit, rope splices partly completed, colored pictures of common birds, a



pressed clover plant showing tubercles on roots, the books on elementary agriculture and nature study used in each school, and the records made by each pupil.

The corn was carefully scored and mention was made of the three who made the best exhibit of four ears each. The most important part of an exhibit of this kind receives least attention; this is the book-form record showing the time of planting, sprouting, times cultivated, etc. Many who had read about tubercles on clover roots saw them first in the children's exhibit.

A long noon intermission gave much time for a close inspection of the exhibit. Besides farmers from the country there were six children from near Troy under the care of M. C. Pierce who is very much interested in this work in Miami county; Professors Crumley and Weaver of Antioch and Prof. Hoke of the State Normal School at Oxford spent much time carefully looking over the work.

No one doubted that the simple facts of elementary agriculture could be very easily taught to boys and girls if there were only a few simple things of an experimental nature to be done. The children want to do something or to make something. They like to be held responsible for a result, if their genius, thought and muscle are reasonably required in securing it. It is a lesson involving doing to know and knowing to do.

The exhibit meant more immediately to the boys and girls than to anyone else. What was there that belonged to anyone of them brought to mind experiences that had both the elements of encouragement and discouragement; his joy at his victory over difficulties was increased by words of praise and encouragement given him by his elders. Many persons go from a meeting of this kind making the oft heard wish that they could be

young again. If we can't be young again let us make ourselves more valuable to the young in a conscious effort to assist them in choosing a work which they may perform with no little indication of genius and with as great a degree of skill as is possible.

An exhibit of products raised by children impresses the partially interested observer that a little book knowledge is very helpful and that the wings of theory are best trimmed by practice. This class of work gives opportunity to consider with people from the farm the necessity for revision of school courses both for their disciplinary and practical value. Here with the work of his own son or daughter before him, the farmer can be reminded that he is being taxed more to support the Industrial School at Delaware for girls and the Industrial School at Lancaster for boys (both commonly called reform schools) than he is paying for industrial education for his own child. He is further adding to this small amount what is being paid for industrial education at the Mansfield Reformatory and at the Ohio Soldiers' and Sailors' Orphans' Home at Xenia. All that he contributes toward such education is well spent but it is a lamentable fact that he spends nothing for his own children's industrial education.

---

During the fortnight beginning Jan. 23, at Urbana, Ill., were held meetings of vital importance to the agriculturist. During the period there were held the meetings of the American Breeders' Association, the Illinois Live Stock Breeders' Association, The Illinois Corn Growers' Association, The Illinois Seed Corn Breeders' Association, and the Corn Growers' and Stockmen's Convention. It was a gathering of the foremost agricultural scientists, investigators and educators of America.

## SUPREME COURT DECISION IN THE MEAT TRUST CASE.

FRED. L. WEST.

The recent decision of the Supreme Court of the United States, sustaining in the main, the injunction of Judge Grosscup restraining the members of the so-called Meat Trust from taking part in or performing any contract, combination or conspiracy restraining trade between the states in violation of the anti-trust law of 1900, has attracted the attention of many people throughout our great commonwealth. This decision makes possible a trial of the packers for contempt, the statement having been made that the court's injunction has been violated so seriously as to render every one of the offenders liable to imprisonment as well as fined—which, however, need not be looked for.

Many are the charges against the trust, among them being, conspiracy to refrain from bidding in competition for live stock, illegal agreement to fix prices for beef, unlawful deal to restrict shipments of meat, keeping a blacklist, improper charges for cartage, conspiracy with railroads to get less than lawful rates for the purpose of excluding competitors and controlling both the price paid for live stock and the markets to which the consumers of meat must go.

The importance of the decision depends upon whether or not the department of justice follows up its advantage. These men are conspirators against the people's liberty and should be punished as all other conspirators are punished, also taking away from them and destroying forever those special privileges which they have so ruthlessly overrun. But, the packers are not the only ones in error. If it is shown that the charges against the railways are also true, and that they have entered

into criminal arrangements with the packers, they should suffer as the packers, and the power of rate fixing taken from them and placed in the hands of an impartial body of the government. The people must have justice and fair play. If under the present system of railroads and other industries, such cannot be had, the people will find another way of obtaining them.

At the same time that the Supreme Court was weighing the charges against the beef trust, the United States Senate,—which is the hope of the monopolist and conspirator, because of the fact that many of its members are beneficiaries of special privileges,—was listening to some interesting testimony concerning the Armour private car line in which it was shown that the vast profit of \$72,000 per day was made from its 14,000 cars, and how its monopoly and power to tax the people is secured the compliant railroads. This was brought out by the investigations of the dealings of the Armour Company and Pere Marquette system with their mutual victims—the producers of fruits along that system and their consumers in towns and cities. Mr. Ferguson, representing the fruit growers of the Northwest, testifying before the Senate interstate commerce committee, said: "The public is completely at the mercy of the Armour Company. The railroads pay the Armour line an average of  $\frac{3}{4}$  to 1 cent mileage for the use of the cars and it is a part of the contract that no other refrigerator cars shall be hauled over that road." He further said: "Prior to the exclusive contract with the Armour line of the Pere Marquette road the refrigerating charge on a carload of peaches from Michigan to Bos-

ton was \$20, but when the Armour contracts were entered into these refrigerating charges were advanced to \$55 a car."

Lawyers recognize that the recent Supreme Court decision in sustaining the prohibitions of Judge Grosscup's injunction extends the scope of the anti-trust law beyond the point reached in any previous decision. It decides that traffic in live stock transported from the state or territory of its origin, to another state for sale, and held there for sale, is interstate commerce, and that those engaged in buying and selling such live stock are engaged in interstate commerce. This question had been before the court on a previous occasion, but left undecided. Besides, the decision condemns an unlawful restraint of trade, the combination between independent dealers for the purpose of suppressing all competition in the purchase of live stock; for the purpose of fixing and maintaining uniform prices in the sales of meat throughout the country; for the purpose of obtaining preferential rates for the transportation of their products by common carriers, making it clear that all combinations between independent individuals, partnerships, or corporations, engaged in interstate commerce by which competition between them in such commerce is suppressed fall under the prohibition of the anti-trust law.

Without lingering too long upon this decision, let us turn a moment to the cause of the disturbance—the Meat Trust. A few months ago there were few citizens of the United States that realized there was such a trust in existence. Now its power is beginning to be felt from coast to coast, and from Canada to the gulf. It has spread itself until now it touches almost every form of industry in the country, tearing

them with its ghastly fingers. People are beginning to realize its power, and are striking for their liberties as true American citizens. They are fighting for their freedom as truly as are the peoples of Russia.

There is one lesson that all nations are learning, and that is that liberty, like truth, though crushed to earth, will rise again, and ultimately will dominate. None need learn this lesson more than we in the United States, where the craze for wealth has caused us to let down the bars to monopoly and special privileges to the extent that gigantic interests have become a menace to our liberties to an extent never known before.

The scope of the power of this enormous trust is most clearly shown by Mr. Charles E. Russell, in an article entitled "The Greatest Trust in the World," appearing in the February number of Everybody's Magazine, in which he says that compared with this mighty octopus the Standard Oil Company "is puerile"; "here is something that affects a thousand lives where the Standard Oil Company affects one." Continuing further he says: "Probably in this year of grace the railroads of this country will pay to the American Beef Trust \$25,000,000 in rebates prohibited by law."

As to sources and uses of the combination's power, he enumerates as follows:

"Of some of the most important industries of this country it has an absolute, iron-clad, infrangible monopoly; of others it has a control that for practical purposes of profit is not less complete. It fixes at its own will the price of every pound of fresh, salted, smoked, or preserved meat prepared and sold in the United States. It fixes the price of every ham, every pound of bacon, every pound of lard, every can of prepared



soup. It has an absolute monopoly of our enormous meat exports, dressed and preserved. It has an absolute monopoly of the American trade in fertilizers, hides, bristles, horn and bone products. It owns or controls or dominates every slaughter-house except a few that have inconsiderable local or special trades. It owns steam and electric roads, it owns the entire trolley-car service in several cities, and it is acquiring like property elsewhere. It owns factories, shops, stock-yards, mills, land and land-companies, plants, warehouses, politicians, legislators, and Congressmen. It defies Wall Street and all that therein is. It terrorizes great railroad corporations long used to terrorizing others. It takes toll from big and little, it gouges millions from railroad companies, and cent pieces from obscure shippers.

"It fixes, for its own profit, the prices the farmer of the West shall receive for his cattle and hogs, and the prices that the butcher of the East shall charge for his meat. It fixes the price that the grower of California shall receive for his fruit, and the price the laborer of New York shall pay for his breakfast. It lays hands upon the melon-grower of Colorado and the cotton-grower of Georgia, and compels each to share with it the scanty proceeds of his toil. It can affect the cost of living in Aberdeen and Geneva as easily as in Chicago and New York. It has in the last three years increased, for its own benefit, the expenses of every household in America. It controls or influences the prices of one-half the food consumed by the nation. It has its share in the proceeds of more commodities of daily consumption than all other trusts, combinations, and monopolies together, and the prices

of these it seeks to augment for its own profit.

"It can make, within certain limits, the price of wheat, of corn, of oats, what it pleases; it will shortly be able to control the price of every loaf of bread. Its operations have impoverished or ruined farmers and stockmen, destroyed millions of investments, caused banks to break and men to commit suicide, precipitated strikes, and annihilated industries. So great is the terror it inspires in some quarters that citizens under the constitutional guarantees of freedom do not dare, even in the privacy of their offices or homes, to speak a word that this power would not approve of, and multi-millionaires, railroad magnates, and captains of industry quail before it. At every step of its progress it has violated national or state law, or both, and with impunity. It has been declared by federal and state courts to be an outlaw and to have no right to exist. It has gone steadily on strengthening its hold, extending its lines, and multiplying its victims."

Such is the size and power of the trust that is now sapping the life blood from one of the greatest industries of the American farmer, and all thinking persons will see that with such a hold upon the industries of the nation this decision of the Supreme Court is but the beginning of the "fight to the death" that is to ensue before the people of this country are to be freed from the monster.

---

Professor J. L. Budd, for twenty-two years head of the horticultural department of Iowa Agricultural College at Ames, died on December 22 at San Antonio, Texas.

## THE NEW CARRIAGE HORSE.

C. D. HYATT.

In the general wrangle resulting from the announcement of the horse-breeding experiment to be carried on by the government, we have been hearing both the "pros" and the "cons" of this question discussed at some length. We have heard a great howl raised about the American trotter, picturing him as a little runt with no constitution, no breeding, and in case a really good horse is produced it is by mere chance. Here is a beautiful illustration of this howl as printed in a live stock journal. The American trotter \* \* \* "has failed in the fifty years' breeding to produce any utility class of horses or any uniform class of any kind except scrubs. A few have been fast and a few have been handsome harness horses, mere freaks of the breed." It is downright foolishness for a man to make a statement like that and expect right minded people to believe it. We admit that too many of our trotters have been bred for speed and that alone, and that there is a rather broad range in type, but it is not true to say that they are, as a rule, speed and scrub. Such "freaks" as the Beaver strain are very common; large, handsome fellows, high-headed and good actors. Look at the so-called hackney breed. Here the size ranges from that of the little polo pony on up to the high-class coacher. The pony has no more of the action or conformation of the hackney, as we are used to think of the term, than has a mule. In fact it is pretty hard to tell just what is included under the name hackney. Now, it would not sound right to say that this breed was made up of scrubs with an occasional freak in the way of a high-stepping carriage horse; but it would be just as true and as justifiable

in this case as in that of the American trotter.

Referring to the above-mentioned article, it says: \* \* \* "the insignificant \$25,000 may do as an entering wedge for a graft scheme, but it cannot make a breed." We would like to say here that we have some confidence in our government yet. Of course this amount would not be enough to make a breed, but the government will not limit itself to any \$25,000. It is clearly set forth that, as soon as this new breed is fairly well established, young stallions will be sent out into different sections of the country for breeding purposes. Now, if the government had any such views as these they would not stop with the \$25,000; there would be many more like it when needed.

And while the government has not taken just the action that we could have wished for, yet we believe that it will ultimately lead to that end, namely, government inspection of stallions. We believe that this will prove a starting point in that direction, since the breeding stock of this experiment must be sound and have size; and from this it is only logical to conclude that, since the government has gone to all the trouble of getting sound foundation stock, the future breeding stock must also be sound before they are allowed to be sent out over the country.

The trotter is all right; the trouble is with those who breed him. If the government would improve this breed as roadsters by selecting large, handsome stock, with plenty of constitution, as they have already begun to do, all will be well and good. There is plenty of speed to begin with and what is now needed is an improvement in size and conforma-

tion which in this case means better bone, shorter legs, longer ribs and a general increase in size and constitution. This has been tried by individual breeders, but, since scarcely any two agree as to the ideal and if they do agree are apt to change their minds every year or so, it seems that this work of selection must come solely through our government. It has already begun and we hope it will continue.

Many charges have been brought up by persons who were prejudiced against this breed either commercially or otherwise, and while some of these charges may be true a great many of them are not true. A good many young men have been ruined by fast horses, we are told, but we believe a greater number of horses have been ruined by fast young men. The trotter is not a mere machine by which gamblers may coin money; he is not a device made solely for the de-

struction of young men's souls; he is not a menace to mankind as a good many think, but a misused, misjudged horse of remarkable speed, utility and endurance. It is true he does get into bad company occasionally and it has left its mark. But that wasn't his fault. Again, it was the fault of the breeder whose ideal was speed and nothing else.

The new breed will have that regular, machine-like stride characteristic of the American trotter, judging from what foundation stock has already been secured. We hope that action will not be sought for to such a degree as in some of the imported breeds, where utility has been supplanted by show. And we know that speed will not be the paramount issue. Summing it up, here is what the government is working for: "It is hoped by these experiments to produce a large-sized, beautifully-finished horse with style, grace, action and intelligence."



"WHEN THE FROST IS ON THE PUMPKIN AND THE FODDER'S IN THE SHOCK."



## ECONOMIC ORNITHOLOGY.

Z. P. METCALF.

Economic ornithology has been attracting more and more attention every year, but as yet our knowledge of it is very elementary. However, it would be impossible to sum up all the knowledge of economic ornithology in a short article. The object of this paper will be to give a few of the leading and well established facts in this branch of science.

Recently there has been much said concerning the advisability of passing a national bird law to protect migrating birds. Few people realize what this would mean to the whole United States. For example the bobolink, in the latitude of Ohio is a very well known and useful bird. In their summer homes they are fairly persistent insect hunters, but during their migration they are seed eaters. During migration they are known first, as the "seed birds" of Maryland and afterwards as the "rice birds" of the Carolinas. In Maryland, bobolinks are shot in countless thousands, and shipped to the northern restaurants. In the Carolinas, they are said to destroy the rice. What this destruction amounts to, it is hard to say, but it is a well known fact that the rice bird is a common article of diet in southern homes. Both of these destructive processes, however, are being abandoned.

Perhaps no group of birds have been more relentlessly pursued than the hawks and owls or birds of prey. The people in general and the farmers in particular seem to think that, because two or three members of the order are "black sheep," all are injurious. Nothing, however, could be farther from the truth than this.

Quoting from the report for 1886 of Dr. C. Hart Merriam, ornithologist and mammologist of the United States Department of Agriculture: "On the 23d

of June, 1885, the legislature of Pennsylvania passed an act known as the scalp act, ostensibly for the benefit of agriculture, which provides a bounty of fifty cents each on hawks, owls, weasels and minks killed within the limits of the state, and a fee of twenty cents to the notary or justice taking the affidavit.

"By virtue of this act about \$90,000 has been paid in bounties during the year and a half that has elapsed since the law went into effect. This represents the destruction of at least 128,570 of the above mentioned birds and animals most of which were hawks and owls.

"Granting that 5,000 chickens are killed annually in Pennsylvania by hawks and owls, and that they are worth twenty-five cents each (a liberal estimate in view of the fact that a large proportion of them are killed when very young) the total loss would be \$1,250 and the poultry killed in a year and a half would be worth \$1,875; hence it appears that during the past 18 months the State of Pennsylvania saved the farmers \$1,875. But this estimate by no means represents the actual loss to the farmer and the taxpayer of the state. It is within bounds to say that in the course of a year every hawk and equivalent in insects, and that each mouse or its equivalent so destroyed would cause the farmer a loss of two cents per annum. Therefore, omitting all reference to the enormous increase in the number of these noxious animals when nature's means of holding them in check has been removed, the lowest possible estimate of the value to the farmer of each hawk, owl and weasel would be \$20 per year or \$30 in a year and a half.

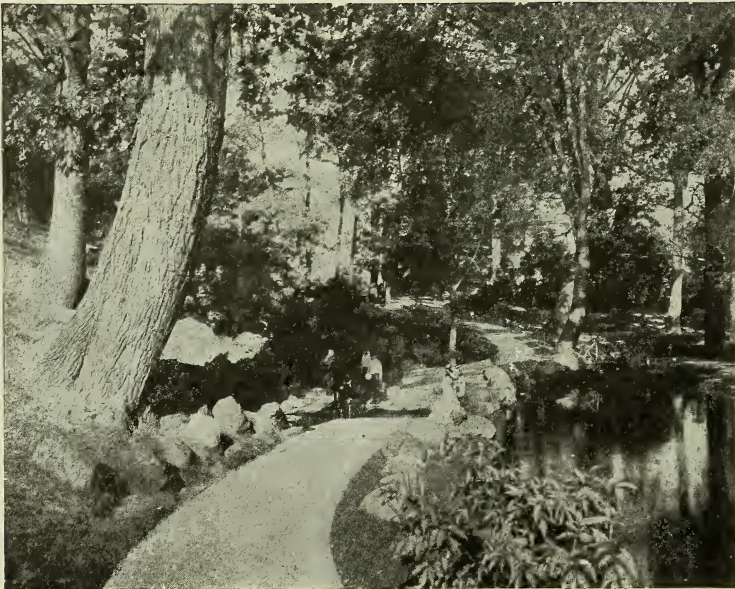
"Hence, in addition to the \$90,000 actually expended by the state in destroying

128,571 of its benefactors, it has incurred a loss of \$3,947,130 in a year and a half, which is at the rate of \$2,631,420 per annum. In other words, the state has thrown away \$2,105 for every dollar saved! And even this does not represent fairly the full loss, for the slaughter of such a vast number of predaceous birds and mammals is almost certain to be followed by a correspondingly enormous increase in the numbers of mice and insects formerly held in check by them, and it will take many years to restore the balance thus blindly destroyed through ignorance of the economic relations of our common birds and mammals."

In 1893, Dr. Fisher, under the directions of the Department of Agriculture, made an examination of the contents of the stomachs of 2,700 hawks and owls,

which were brought from all parts of the U. S. Dr. Fisher established beyond a doubt the economic relation of all our hawks and owls. The results prove a class of birds commonly looked upon as the farmer's enemies are among his best friends.

Out of the 73 species of hawks and owls in the U. S., only six are injurious and four of these are so very rare that they may be left out of consideration entirely. Omitting the six injurious species, 56 per cent, of the stomachs contained mice and other small mammals, 27 per cent. insects and 3½ per cent. poultry and game birds. This proves beyond a doubt that the injury which is done by hawks and owls is more than counterbalanced by the good that they do.



UNIVERSITY SPRING

## THE EVOLUTION OF LAND DRAINAGE.

HARRY C. RAMSOWER.

Way back even beyond "ye olden times" when ancient Greece was at the zenith of her power and the pens of her most distinguished scholars were giving to the world a literature and learning unsurpassed by that of any other nation, none can be found who championed the cause of agriculture, primitive though it must have been. True, her poets and literary artists frequently mention husbandry in their writings, but usually in a contemptuous way. And this is but natural for, invading, subduing, and bringing under her subjection all border nations and peoples she hated alike the tiller and the tilled, flattering herself that she was engaged in nobler pursuits, namely, art, literature and philosophy. So not until the rise of Roman power do historical records give us anything at all reliable regarding the state of agriculture at that time.

Columella, who lived in the time of Augustus, was the first to write extensively on the subject and the first to treat of drainage. True, even before him husbandmen had learned that, though water is absolutely necessary for plant growth, a superabundance is just as detrimental as its entire absence, and had used open drains to rid the soil of surface water. Columella, however, writes not only of the open drains, then used almost exclusively, but also of closed ditches which, he says, should be filled to half their depth with stones.

In 1600 Oliver de Serres, a Frenchman, mentions the closed ditches of Columella and contends that such a ditch to give the best results should be at least four feet deep.

It was not until 1652, however, that Walter Blithe, an Englishman, first

brought prominently before the public the need of underdrainage and suggested means for carrying it out, the full value of which it took centuries for the people to learn. He wrote: "Superfluous and venomous water which lyeth in the earth and much occasioneth boggesse, rushes, flags, and other filth is indeed the chief cause of barrenesse in any land of this nature. \* \* \* Drayning is an excellent and chiefest means for their reducement. \* \* \* After thou hast brought a trench to the bottom of the bog. \* \* \* Then thou must take good, green fagots, willow, alder, elme or thorne and lay in the bottome of thy works and then take up the turf thou tookest up in the top of thy trench and plant upon them with the green sward downwards. 'Or take great pebbles, stones, or flint stones and so fill up the bottom of thy trench about 15 inches and cover as aforesaid. \* \* \* Then waite and expect a wonderful effect through the blessing of God." But Mr. Blithe was more of a scholar and writer than a practical worker and though he waited his wonderful effect failed to come, to his generation at least, due perhaps more to lack of effort on the part of man to attend such result than through lack of Divine blessing.

In 1764 Mr. Elkington of Warwickshire presented a new system of drainage. He held that water in wet and boggy places is forced up from beneath the ground and if these underground reservoirs could be tapped the surface would be freed from water. He, himself, practiced this system to a considerable extent and was very successful. His ideas were in part correct and where topography and underlying strata



of rock are favorable large areas can be speedily and cheaply drained.

The old saw that "There is nothing new under the sun" seems to be substantiated when in 1823 we find James Smith of Deanston rediscovering, as it were, the principles advocated by Blithe almost 200 years before, and practically the same as mentioned by Columella nearly two thousand years since. Mr. Smith was of a more energetic and practical nature than either of his predecessors and personally carried out his own ideas, that is, the advisability of using closed drains, and thus obtained public recognition of their merits, so that from this time on the science and art of drainage made steady progress.

Thus far nothing in the shape of tile had been used to any extent more than stones set in a triangular shape in the bottom of the ditch. England is often given credit for the invention of tile, but history tells us that in a certain province in France once stood a monastery, the lands adjacent to which were extremely fertile. Sometime after the French Revolution excavations were made on this estate and two complete systems of pipe drains were found—one in radial lines emptying into a sinking well, the other in parallel lines emptying into a collecting pipe which in turn discharged into a cellar. These pipes are said to have been ten inches long, four inches in diameter, funnel-shaped at one end and tapering to a cone at the other. The age of this system is not exactly known, but a grave was once found above it bearing the date of 1620. That the system was well planned and laid is shown by the fact that it drained the land perfectly for three hundred years.

The first tile to be used extensively, however, was used in England, and was

known as the "horseshoe" tile, resembling a horseshoe in shape, made by rolling out a piece of clay and pressing it over a block of the desired size. This did not prove satisfactory as the bottom of the ditch would soften and mud would work up into and fill the tile. A flange of one or two inches in width was then used on the lower edge of the tile, but failed to correct the fault. A slab was next taken, laid in the bottom of the ditch with the tile upon it. This served the purpose well and the next move was to attach this slab, in the shape of a sole, to the bottom of the tile, or, in other words, to make a flat-sided tile. This soon gave way to the round tile, made at first by rolling a flat sheet of clay into the shape of a pipe, leaving the seam where the edges met open for the entrance of water, which entrance was at that time deemed quite necessary. Since this time many forms of tile have been made and used—the triangular tile, the square tile, the octagonal tile, the round tile, tile with shoulders and tile without shoulders, but authorities seem to agree that the type which serves its purpose best is the one which is round, straight, with clean-cut edge, hardburned but not vitrified, and strictly free from lime.

Such in brief are the stages through which this important branch of agriculture has passed. The modern methods of laying out and digging the drain we cannot here discuss. But let it suffice for the present to say that within a space of fifty years the practice has developed from one primitive and simple to a complicated art which, together with a thorough knowledge of the science underlying it, has enabled us to reap from the once boggy swamps and salty marshes harvests which can but delight the hearts of those who have figured in the transformation.

## SAN JOSE SCALE.

C. L. MINER.

Now is the time for farmers and fruit growers to look over their orchards for the San Jose scale. This is one of our most destructive orchard pests and very stringent measures should be adopted if it is found.

If at this time the scale is believed to be in the orchard, a few infected twigs should be sent to the Ohio Agricultural Department, Columbus, O., for positive identification and directions for its best treatment. This department is doing a great work towards controlling the various insects and fungi pests of our orchards. Each fruit grower should make it his duty to do everything possible to help and co-operate in this noble endeavor of advancing the agriculture of our state.

The infected trees especially the apple and pear, may be detected in summer by the specks of pinkish coloration on the fruit where the scales have been located. When the scales are scatteringly located on the tender twigs of the apple, pear and especially the peach the distinct coloration around each is almost as noticeable as on the fruit and is of the greatest service in facilitating the inspection of trees. Upon further examination the wood, if the scale is present in very large numbers, will be completely incrustated and the bark have a grayish and somewhat mottled appearance, which is quite characteristic.

A knowledge of certain portions of the history of this scale insect is very necessary to the orchardist if he would guard against its spread. The young generally begin to emerge from under the female scale in this latitude about June 15, remaining active after birth twenty-four to thirty-six hours. In his somewhat limited observation of this insect the writer

has noticed that the young seldom travel more than seven inches from their birthplace before permanently locating. The females cannot fly and the most common method of spreading the scale in an orchard is by the wind blowing the larva onto the adjoining tree. They commence feeding on the sap of the tree by forcing their long bristle-sucking beaks into the cambium layer of the bark.

Almost before the insect locates it is being covered by a light yellow waxy scale secreted by glands on the dorsal surface. Here maturity is reached and in about six weeks another generation is produced. Thus we see that in the course of a summer or autumn season a vast number is formed on one tree. The minute round scale covering when first formed is light yellow and turns nearly black in six or seven days by exposure to the air. The slowly formed additions to the rim are brownish gray. At maturity the central portion of this scale covering assumes a somewhat nipple-shaped form caused by a slight depression between it and the succeeding deposits of growth.

In the winter the female scales being about the size of a pin head can be easily detected from the darker immature ones. About forty per cent. of the scales survive the rigors of winter being mostly the fully developed light colored ones.

This pest as yet has very few natural enemies which accounts in a large measure for its prolificacy—a single female being the ancestor of hundreds of thousands in a single year. Experiments at Washintgon have shown that on the average a single female will produce under favorable conditions four hundred young. In the latitude of Ohio four or five generations are produced each year.

Counting one half the offspring females we can thus see how remarkably rapid this scale insect will encrust a tree.

China has been found to be the native home of this insect and during investigations there the ladybird beetle (*Chilocorus similis*) was found to be an effective natural enemy. With a view of checking the San Jose scale in this country colonies of these beetles were started a few years ago in Georgia, New Jersey, and in Ohio near Cincinnati and at Marblehead, Ottawa county. All these colonies have perished, seeming to have been unable to acclimate themselves to our climate. This ladybird is a little smaller than the twice stabbed ladybird so often seen feeding on the Putnam and Scurfy scales of our orchards, having the same markings of black wing covers with a small round orange spot on the center of each.

Because of the scale's resistance to applications of insecticides, we should take every precaution in buying our fruit trees. We can do no better than to patronize our nearest nurseries whose trees we can examine. If agents are necessary we should be sure they represent inspected nurseries holding certificates.

Each nursery in the state is carefully examined each year by trained men from the Ohio Agriculture Department and a certificate is given so there need be no fear of buying trees from credible nurserymen of Ohio. In case there is the least suspicion of danger from infection all the trees sold from that nursery are carefully fumigated under the supervision of the State Agricultural Department. Each certificate of inspection that goes with an order of fruit trees shows that every precaution possible has been taken to avoid the spreading of infectious diseases or insects.

In case the San Jose scale is discovered in the orchard the trees should be carefully and thoroughly trimmed if

treatment is to be carried on, all surplus branches being burned.

The most effective treatment used in Ohio at present is the lime and sulphur wash. This is a modification of the lime, sulphur and salt wash so successfully used in California. It is made of fifteen parts each of quick lime and sulphur. The lime and sulphur are boiled in four gallons of water for one hour. This is then diluted to fifty gallons and sprayed from the tank while hot. The continued boiling is to make the sulphur soluble. A chemical combination takes place in the boiling, forming sulphides of lime. When properly made the wash has a dark brown color. The lime and sulphur wash has been used in the extensive peach orchards of Ottawa county. The cost of making ranges from one and a quarter cents to one and one-half cents per gallon, depending mostly on the cost of material. Salt or copper sulphate have been added in varying quantities to this wash with a view of making the spray stick to the trees longer, but it has been found that the lime-sulphur wash alone remains on the bark long enough to kill every scale insect it touches. The peach leaf curl has been effectively checked when copper sulphate was used in this spray. The spray is applied in winter or early spring before the buds begin to swell lest the strong mixture kill the fruit and leaf buds. Great care should be taken to cover all parts of the limbs and twigs thus requiring two or three applications. As the mixture discolors the bark it is easy a day after spraying to see the missed parts, then when the breeze will carry the spray towards the exposed bark the entire tree may be completely covered. This is a powerful corrosive compound and the operator's hands and the team should be carefully protected from it. It is, however, impossible to reach every scale by



spraying for some are so well protected under the small pieces of bark.

This unwelcomed foreigner is here to stay as long as we have fruit trees, but this fact should not discourage the fruit grower. One who can look forward into the future will see it as a blessing in disguise. The progressive fruit grower will take more care of his trees and look after them as the farmer of today looks after his crops or live stock, thus reaping better fruits in return. The careless man and

others with but few trees who will not spray will sooner or later lose their fruit supply. Such a change will lessen the inferior fruits loaded on the markets and will establish a better demand with higher prices for the fruits of the man who sprays. The time is at hand when systematic spraying must be carried on to produce first class orchard fruit as a crop and the man who grasps the situation is the one that will prosper in the fruit business of Ohio.

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## THE OHIO LIVE STOCK ASSOCIATION MEETING.

E. R. MINNS.

The first annual meeting of the Ohio Live Stock Association was held at the Ohio State University February 7 and 8, 1905. The organization was formed January 15, 1904, and during the year enrolled seventy-two members. This, its first convention, was a success from the start. Representative stockmen of the state and students of the College of Agriculture made up the audiences in which enthusiasm was not lacking.

Bulletin No. 1 of the association has been issued during the year.

The papers and addresses given were valuable and an annual report in which they will be published is promised.

"Do We Need a New Breed of Carriage Horses?" was the subject of a paper by James B. McLaughlin of Columbus. Dr. D. S. White, dean of the College of Veterinary Medicine, addressed the association with some remarks on immunity against tuberculosis in which he pointed out the defects of Von Baring's method of immunizing cattle against tuberculosis.

"The Market Grades of Beef Cattle" was the subject discussed by Prof. H. W. Mumford of the Illinois University and Experiment Station. His address was highly commended and he was

made an honorary member of the association.

"Feeding Silage to Beef Cattle" was treated in a very practical way by Humphrey Jones of Washington C. H., Fayette county, who has made a success of this work, and could tell of its advantages and disadvantages.

A short paper entitled "Experience in Feeding Western Range Cattle" was read by Hon. J. M. Willis of Bloomingburg, Fayette county.

At the only evening session, President O. E. Bradfute gave a masterly appeal for the proper recognition of the American stockman. He was followed by Dr. W. O. Thompson, president of O. S. U., who clearly and earnestly presented his views on the subject, "Agricultural Education."

"Feeding Silage to Dairy Cattle," by C. G. Williams of the Ohio Experiment station, and "Comments and Criticisms on the American Type of Swine," by I. L. Wylie of Granville, Licking county, were the addresses of the first session of the second day. At the last session, Dr. Paul Fischer, Ohio State veterinarian, read a very able paper entitled "Glanders; Its Nature, Distribution and Pre-

vention." Geo. M. Wilbur of Marysville, Union county, read an excellent paper on "The Care and Management of Ewes Before and After Lambing."

McLaughlin Bros. of Columbus brought out a number of their noted prize-winning draft and carriage horses at the close of one session, for inspection

by the breeders present. There was much helpful discussion during the sessions. Numerous resolutions were passed before adjournment and all old officers were re-elected. A committee will be appointed to seek the affiliation of all breeders and feeders associations in the state with this organization.

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## FARMING IN EASTERN OHIO.

J. V. HYATT.

To warrant the following remarks we will first state as nearly as possible the average prevailing conditions for the three counties, Carroll, Columbiana and Jefferson.

The land is rolling to quite hilly, mainly sandstone with here and there an area of good limestone soil, and the farms are usually small, averaging 105 A. for Carroll, 84 A. for Columbiana, and 122 A. for Jefferson Co.; over 65 per cent of the total number of farms in the three counties being between 50 A. and 175 A. in size and not quite 4 per cent above 260 A. The buildings are fair; the barns probably above the average, and there is a very mixed system of farming carried on. Corn, oats, wheat, hay, and pasture are the usual crops, the rotation ranging in length from four years for some farms to eight or nine years for others. Nearly all of the grain, stover and straw is fed on the farm, but a great deal of hay is baled for the Pittsburg market.

All kinds of common farm livestock are grown throughout the section, but in varying proportions for different farms. Sheep were formerly the main standby for these counties, and do well here yet although comparatively few are now kept, the last twenty years tendency—from which there now seems to be a healthy reaction—being toward fewer sheep and more dairy cows.

We say a healthy reaction because we believe that there is nothing that will pay better than a flock of good sheep, well cared for, to say nothing of the constant satisfaction that may be derived from doing the proper thing in the proper place. Those dry sandy hills and ridges of Eastern Ohio will not make the best horse or cattle pasture, neither can their fertility be maintained if cultivated; but they are excellent for sheep pasturing, as on these hills there is a great deal less danger from internal parasites, in fact some good authorities hold that this is the only solution of this question so weighty with sheep men. Then by using the hills for pasturing, the more level land could be profitably farmed and would produce sufficient roughage and grain to keep the sheep in good stock condition, thus doing away with one of the present heavy bills of expense—the feed bill. Sheep farming would also lessen the trouble of maintaining farm fertility, as it is an old, and we believe a true, idea among farmers that sheep are the best farm animals to keep up the fertility. The ease and pleasure of sheep growing as compared with other branches of livestock raising is a consideration not to be overlooked; sheep require very little attention for nearly half the year and at least no more for the remainder than any other class of

stock, and are easily marketed. The wool is at all seasons of the year a salable product and, although it does not bring as high a price as formerly, it is yet a valuable resource and one not to be despised.

Another way in which the farmers could easily improve their present system would be in the raising of better and larger horses. In the old time of the supremacy of the "general purpose horse" this branch of stock growing was important and profitable, but later the trotting horse struck the locality with full force and breeding trotters became almost a craze. The farm mares were indiscriminately crossed to trotting stallions of indifferent quality the result being a mongrel, in the majority of cases, fit for nothing in particular. This continued till about 15 years ago when there was a strong revulsion of feeling in favor of the larger horse and these trotting bred mongrels were bred to draft stallions of more or less size and quality, the produce of course being a disappointment in nearly all cases. These colts were usually large and ungainly, awkward and hard to keep, really having no place in the world, or in some cases they were small chunks, without the vim and vigor of the old general purpose animal, or the size necessary to the drafter. Do not misunderstand, there is a place and a good one for the trotter as there is for the drafter; but it is this sinfully indiscriminate crossing of types which has almost ruined the horse industry in this section, not only by producing a poor class of horses but by prejudicing the average farmer against these two noble breeds or classes so that now there is very little demand for horses except locally for farm purposes, and at prices which at times barely pay for actual money cost of producing.

Then there is another serious condition of thought among the majority of the farmers. They have read in the agricultural papers that breeding stock should not be too fat, and have taken this to mean that breeding animals should carry no fat whatever, making it no uncommon sight to see otherwise wide awake men breeding from animals in a condition bordering upon starvation. Bulls especially have been stunted and half starved from generation to generation until, even with pure beef breeds of which the great majority are Short-horns, it is almost impossible to raise a first class, growthy, well rounded steer. Of course these observations will not apply to all farmers but we fear they will apply to the great majority with more or less force.

To sum up we will suggest that what agriculture needs in this section is, a greater love for farming, better business methods applied to it, more sheep, rightly and intelligently cared for, fewer and better fed cattle and a better system of horse breeding. But above all is needed a waking up, a coming in touch with other and more thorough farming, and a closer, more intimate acquaintance with the Agricultural College and its work of which they practically know nothing at present.

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#### General Agricultural News.

At a recent meeting of the board of trustees of the Iowa State College, Professor S. A. Beach, horticulturist at the New York Experiment station, was elected professor of horticulture and horticulturist at the Iowa Experiment station. This position has been vacant during the past year, due to the resignation of Professor H. C. Price, who resigned to become dean of the College of Agriculture of the Ohio State University. Professor Beach is an alumnus of



the Iowa institution and has been connected with the New York station for a number of years. He is now employed in the publication of an important work on the pomology of New York for which the legislature made an appropriation of \$20,000.

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"The Farmer's Handbook," containing the laws of Ohio relating to agriculture, has been recently published. It contains 406 pages, is fully indexed and shows care in editing and arrangement. Secretary W. W. Miller, of the Ohio State Board of Agriculture, compiled the book and is to be complimented on the excellence of the work. It is a volume of great value to every farmer in Ohio and Secretary Miller, on receipt of 15 cents to pay postage, will mail a copy to any address. Secretary Miller's address is Columbus, Ohio.

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The Missouri Agricultural College and the State Board of Agriculture, in co-operation with the Burlington railroad, have just completed arrangements for running over the Burlington lines in that state a special train for the purpose of improving the corn crop of the state. Lectures will be supplied by the Missouri college and by the State Board of Agriculture, and the special train will carry them over the Burlington lines, making 20-minute stops at the principal stations. At every stop the lecturers will deliver lectures and demonstrations on improved seed corn and soil fertility.

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At the National Forestry Congress held in Washington, D. C., during the first week of January, over five hundred earnest men came together for the discussion of the practical problems of forestry. This fact is at least encouraging. Our timber supply is rapidly

declining, and it is time that concern should be felt about the situation that is confronting us. In spite of all substitutes for timber, which are many, more is now needed than ever before, and any organization that will help to avert a future timber famine deserves support.

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#### University News.

Ohio State's basketball team still continues to add the scalps of its opponents to its already large string, having played ten games so far this year, winning eight of them and losing two, one of those at the end of a three days' trip, when our team would naturally be playing at a disadvantage, and also playing the game on a strange floor. The games and results since our last issue have been as follows:

January 21—Purdue 23, Ohio State 26.

January 28—Oberlin 21, Ohio State 27.

February 4—Cincinnati 6, Ohio State 43.

February 9—Wooster 19, Ohio State 37.

February 10—Reserve 20, Ohio State 39.

February 11—Oberlin 36, Ohio State 20.

February 18—Denison 19, Ohio State 34.

February 20—Minnesota 27, Ohio State 25.

The game with the University of Cincinnati was the first athletic contest with that school for years, while that with Reserve the first since the football game in the fall of 1901.

The games are all well attended, showing a greatly increased interest in the winter term college sport, and speaking well for the new system of athletic regulations recently adopted by the Athletic Association.

The girls' team has been equally successful, defeating the Ohio Northern girls on February 3 in a fast well played game by a score of 13 to 4.

On January 27, the Glee and Mandolin clubs gave a concert at Mt. Vernon. They were greeted by a large and appreciative audience. A similar concert was given at the State Hospital on February 13, while on February 18 they went to Carrol, Ohio, to furnish the music for the farmer's institute in session there. The Girls' Glee club will give its annual concert on the evening of Friday, March 17.

The carelessness of some student in chemistry almost resulted in the destruction of Townshend Hall by fire on Saturday, Feb. 11. The gas pressure was low and a student left a Bunson burner turned on at full blast, when he left the room for a few moments. During his absence high pressure again came on, shooting the flames up so as to come in contact with the wooden hood in which it was burning. This caught and the fire started up the ventilator chute into the attic. At this moment it was discovered by the janitor, and was soon extinguished by means of the emergency hose kept in various parts of the building for just such occasions. The resulting loss was but slight.

Quite a number of specimens from the Phillipine exhibit at St. Louis have been received for the University by Prof. Lazebny. These will be used for teaching purposes.

Several students have contracted typhoid fever this winter from the use of the city water. All persons have been frequently warned not to drink this water, but some still persist in doing so. The University spring water has been analyzed from time to time, and is reported entirely free from disease germs.

The Strollers have chosen for their next presentation, the play "Incog." The caste has already been selected and rehearsals are now in progress. It is expected that the club will make a tour through Ohio sometime later in the year, presenting the same play at various towns, and also locally at some of the down town theaters.

The first indoor meet was held in the University gymnasium on February 11, between the Sophomores and the other three classes of the University, the result being a defeat for the Sophomores by a score of 51 to 42.

On February 18, Otterbein University's team was met and defeated by a score of 74 to 21. In these two meets, out of twelve events six of the gymnasium records were broken, which speaks well for this year's team.

The apparatus for the equipment of the Physics department has just arrived. They consist of a large portion of the English and German apparatus on exhibition at the St. Louis Exposition. They are all of first quality.

#### Alumni Notes.

Mr. James A. Winspeare, certificate '95, a dairy farmer of Vickers, O., is now at Mesa, Wash., on a trip through the West.

H. E. Dwyer, ex-'04, has been engaged for some time in cattle ranching, with headquarters at Herr, N. Dak.

Philip Bear, '97, is proving to the people around Canal Dover, that scientific agriculture pays. He has been very successful since graduation.

Fred Estel, ex-'05, of Springfield, has recently set up business for himself near his old home. We wish him success.

Prof. M. F. Miller, '00, Professor of Agronomy in Columbia College, Mo., has just returned from a trip through Missouri on a "Corn Special." The trip was designed for the purpose of disseminating agricultural knowledge among the farmers of the state.

Lamotte Ruhlen, '02, who holds a position in the Department of Soils, was in Columbus recently calling upon old friends. He is at present on furlough, having taken sick while in Louisiana, and returned home to recover his health.

#### Dairy Notes.

Professor Decker was in Wisconsin the week of February 19-25 attending the Wisconsin Buttermakers' Convention in session at Fond du Lac. At this convention over \$1000 was offered pro rata for butter exhibited.

The week previous to this the students in dairying at the University were engaged in making butter, which Professor Decker took with him to be scored by the butter judge of the convention, Mr. E. H. Keiffer of Iowa.

At the end of the school term, the regular course agricultural students taking work in dairying, in company with Professor Decker, will visit several creameries throughout the state, in order to gain information, to prepare plans for various forms of creameries. This is a part of the work of the regular students in the winter term work in dairying.

Detailed students from the Special Dairy Class are spending this week in the dairy power house, under the direction of Mr. Mangold. They have been taking some special work in the running of an engine, pipe-fitting, and gen-

eral overhauling of engines and pumps. From now on considerable of this work will be done in the classes of the regular agricultural students in the course in "Elements of Dairying."

At the last faculty meeting the work in agricultural chemistry was cut out of the special dairy course and a one-hour lecture period and one laboratory period in dairying added, while the work in Mechanical Engineering—Steam Engines and Boilers—was made elective instead of required.

Professor Morey is giving some very practical work to the Special Dairy Class in the Bacteriology Laboratory, such as demonstrations in making media, measuring bacteria and distinguishing the various types.

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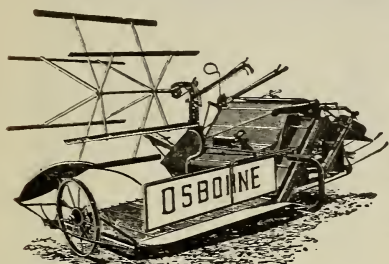
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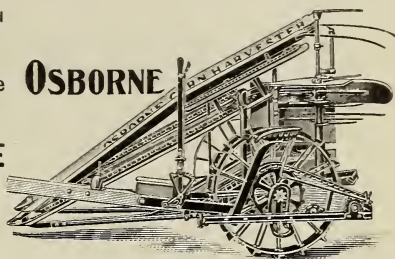
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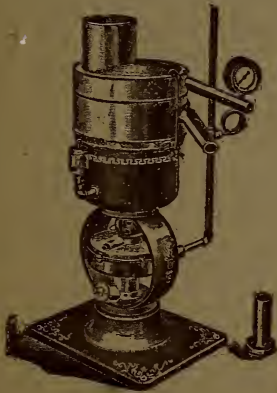
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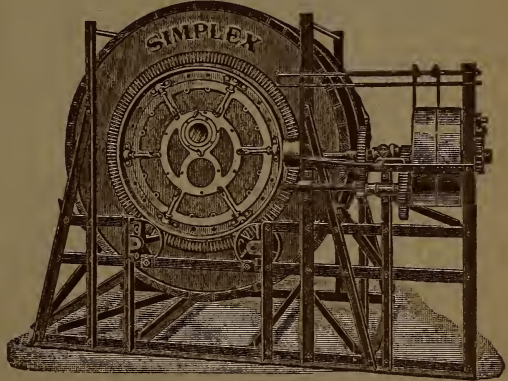
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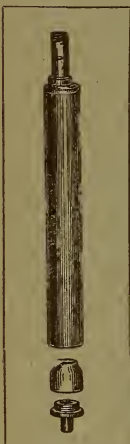
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